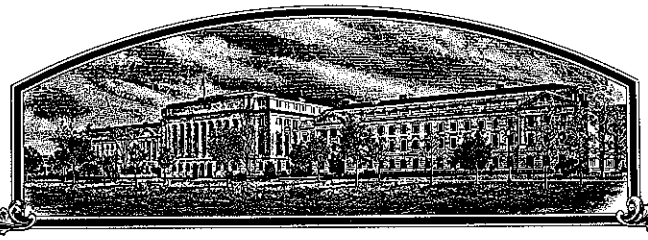


No. 9000110

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Tohoku National Agricultural Experiment Station
Ministry of Agriculture, Forestry and Fisheries

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT TY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

SOYBEAN

'Kosuzu'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington, D.C. *this* 30th *day of* September *in the year of our Lord one thousand nine hundred and* ninety-two.

Attest:

Kenneth A. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Edward Madigan
Secretary of Agriculture

TNA-7705

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Tohoku National Agricultural Experiment Station, Ministry of Agriculture, Forestry and Fisheries

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.
Tohoku No. 85

3. VARIETY NAME
Kosuzu

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
4, Akabira, Shimokuriyagawa, Morioka-shi, Iwate 020-01, Japan

5. PHONE *(include area code)*
0196-41-2145

FOR OFFICIAL USE ONLY

PVPO NUMBER
9000110

FILING
Date: Mar. 5, 1990
Time: ☐ A.M. ☑ P.M.

FEES RECEIVED
Filing and Examination Fee: $ 2150.00
Date: Feb. 28, 1990
Certificate Fee: $ 250.00
Date: August 19, 1992

6. GENUS AND SPECIES NAME
Glycine max

7. FAMILY NAME *(Botanical)*
Glycine

8. CROP KIND NAME *(Common Name)*
Soybean

9. DATE OF DETERMINATION
28 March 1989 JH 8 Oct. 1992

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
A National Experiment Station

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Le-Nhung McLeland
Armstrong & Kubovcik
1725 K St., N.W., Suite 1000
Washington, D.C. 20006
JH 24 August 1992

FAX: 202-887-0357
PHONE *(Include area code)*: 202-659-2930

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. ☒ Exhibit A, Origin and Breeding History of the Variety.
b. ☒ Exhibit B, Novelty Statement.
c. ☒ Exhibit C, Objective Description of Variety.
d. ☒ Exhibit D, Additional Description of Variety.
e. ☒ Exhibit E, Statement of the Basis of Applicant's Ownership.
f. ☐ Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office _____.
g. ☒ Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
☐ YES *(If "YES," answer items 16 and 17 below)* ☒ NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ☐ NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
☐ YES *(If "YES," through* ☐ Plant Variety Protection Act ☐ Patent Act. Give date: _____.)
☒ NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
☐ YES (If "YES," give names of countries and dates)
☒ NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
Hideo Chisaka	Director of Tohoku National Agricultural Experiment Station	Feb. 9, 1990
SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
		1

SOYBEAN

"Kosuzu"

14A. Exhibit A: ORIGIN AND BREEDING HISTORY

A new soybean variety "Kosuzu" was developed from an original variety "Natto-Shohryuh" by the Tohoku National Agricultural Experiment Station (Kariwano Laboratory, Akita, Japan). Dormant seeds of "Natto-Shohryuh" were irradiated with 10KR of ^{60}Co γ-rays at the Institute of Radiation Breeding, Ibaraki, Japan, and then planted in a field at the Kariwano Laboratory for the breeding an M1 individual and the selection of a M2 variation individual, in 1979. Then, as "Karikei No. 221" is was subjected to a preliminary performance test and local adaptability test in 1983. As a result, it was found that the present varieties have an earlier maturity and a further improved lodging resistance than the original variety, "Natto-Shohryuh", and thus were subjected to a performance test as Tohoku No. 85 to determine recommendable varieties and carry out tests of specific character at different field plots in Japan, from 1984. In 1986, the generation M8 was obtained. This variety was not segregated with regard to the items described in the following Exhibit C. Accordingly, it is concluded that the average values of the lines are statistically equal and generically uniform, and therefore, that "Kosuzu" is uniform and stable within commercially acceptable limits.

SOYBEAN

"Kosuzu"

14B. Exhibit B: Novelty Statement

To our knowledge KOSUZU most nearly resembles Natto-Shohryuh. "Kosuzu" differs from the original variety "Natto-Shohryuh", in that it has an about 2 weeks earlier maturing stage, and an improved lodging resistance.

SOYBEAN
"KOSUZU"

14B. SUPPLEMENTAL EXHIBIT B: Novelty Statement

KOSUZU is most similar to Natto-Shohryuh.

Natto-shohryuh is a tall plant with a long main stem, abundant main stem nodes, moderate branching, and a determinate growth habit. The leaflet shape is oval. The hypocotyl and flower are purple. The pubescence is gray and vertical, and moderate in number. The pod color at maturity is tan. The seeds are very small, but the productivity is high. The seeds have a moderate crude protein content and a low crude lipid content. The flowering time and maturing time are moderate, and the resistance to lodging is poor.

KOSUZU has an earlier maturing stage and an improved lodging resistance, as compared to Natto-Shohryuh. The following data on maturity and lodging score was obtained in tests conducted in duplicate randomized block design on sixty individuals at the Tohoku National Agricultural Station (Kariwano Laboratory, Akita Prefecture, Japan) from 1983 to 1986. The tests were conducted according to the method described in Crop Science, Volume 32, No. 1, 182, which is the usually accepted method for confirming differences between characteristics of varieties in this field.

Year	Maturity Date			
	KOSUZU	Range	Natto-Shohryuh	Range
1983	Oct. 14	Oct. 13-15	Oct. 27	Oct. 26-28
1984	Oct. 5	Oct. 4- 5	Oct. 25	Oct. 25-25
1985	Oct. 7	Oct. 7 - 7	Oct. 29	Oct. 28-30
1986	Oct. 10	Oct. 9-10	Oct. 29	Oct. 27-30

Year	Lodging Score			
	KOSUZU	SE	Natto-Shohryuh	SE
1983	1.85	± 0.115	2.48	± 0.139
1984	3.20	± 0.136	4.39	± 0.102
1985	2.04	± 0.114	3.25	± 0.133
1986	2.76	± 0.143	3.48	± 0.132

Note 1) The range of Maturity date is two replicated data.
2) Lodging Score is based on a score of 1 to 5, with 1 indicating plants erect and 5, all plants prostrate.
3) SE is standard error and probability level is 0.05.

The ranges shown in the "Maturity Date" table are very narrow, and show that KOSUZU consistently has a maturity date which is approximately two weeks earlier than Natto-Shohryuh.

The data in the "Lodging Score" table, which includes data on standard error and the probability level, shows that KOSUZU consistently has an improved lodging score as compared to Natto-Shohryuh. As illustration, KOSUZU tested in 1983 had a lodging score of 1.85 ± 0.115 in more than 95% of the individuals.

The earlier maturity and higher resistance to lodging of KOSUZU as opposed to Natto-Shohryuh are very significant for crops in the Northeastern region of Japan, where the weather is unseasonable for harvesting the crop late in the season, so that its lodging is significantly increased. A soybean variety having an earlier maturing stage is particularly desirable in that geographical region.

FORM APPROVED: OMB NO. 0581-0055

EXHIBIT C
(Soybean)

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK, MEAT, GRAIN & SEED DIVISION
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MARYLAND 20705

OBJECTIVE DESCRIPTION OF VARIETY
SOYBEAN (Glycine max L.*)*

NAME OF APPLICANT(S)	TEMPORARY DESIGNATION	VARIETY NAME
Tohoku National Agricultural Experiment Station, Ministry of Agriculture, Forestry and Fisheries	Tohoku No. 85	Kosuzu

ADDRESS *(Street and No., or R.F.D. No., City, State, and Zip Code)*

4, Akabira, Shimokuriyagawa, Morioka-shi, Iwate 020-01, Japan

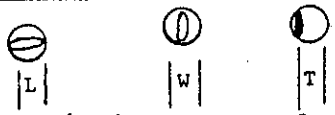
FOR OFFICIAL USE ONLY

PVPO NUMBER 9000110

Choose the appropriate response which characterizes the variety in the features described below. When the number of significant digits in your answer is fewer than the number of boxes provided, place a zero in the first box when number is 9 or less (e.g., [0][9]).

1. SEED SHAPE:

[1]



1 = Spherical (L/W, L/T, and T/W ratios = < 1.2)
2 = Spherical Flattened (L/W ratio > 1.2; L/T ratio = < 1.2)
3 = Elongate (L/T ratio > 1.2; T/W = < 1.2)
4 = Elongate Flattened (L/T ratio > 1.2; T/W > 1.2)

2. SEED COAT COLOR: (Mature Seed)

[1] 1 = Yellow 2 = Green 3 = Brown 4 = Black 5 = Other *(Specify)* _____

3. SEED COAT LUSTER: (Mature Hand Shelled Seed)

[1] 1 = Dull ('Corsoy 79'; 'Braxton') 2 = Shiny ('Nebsoy'; 'Gasoy 17')

4. SEED SIZE: (Mature Seed)

[0][8] Grams per 100 seeds

5. HILUM COLOR: (Mature Seed)

[2] 1 = Buff 2 = Yellow 3 = Brown 4 = Gray 5 = Imperfect Black 6 = Black 7 = Other *(Specify)* _____

6. COTYLEDON COLOR: (Mature Seed)

[1] 1 = Yellow 2 = Green

7. SEED PROTEIN PEROXIDASE ACTIVITY:

[ ] 1 = Low 2 = High

8. SEED PROTEIN ELECTROPHORETIC BAND:

[ ] 1 = Type A ($SP1^a$) 2 = Type B ($SP1^b$)

9. HYPOCOTYL COLOR:

[4] 1 = Green only ('Evans'; 'Davis') 2 = Green with bronze band below cotyledons ('Woodworth'; 'Tracy')
3 = Light Purple below cotyledons ('Beeson'; 'Pickett 71')
4 = Dark Purple extending to unifoliate leaves ('Hodgson'; 'Coker Hampton 266A')

10. LEAFLET SHAPE:

[2] 1 = Lanceolate 2 = Oval 3 = Ovate 4 = Other *(Specify)* _____

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11. LEAFLET SIZE:

[1] 1 = Small ('Amsoy 71'; 'A5312') 2 = Medium ('Corsoy 79'; 'Gasoy 17')
3 = Large ('Crawford'; 'Tracy')

12. LEAF COLOR:

[2] 1 = Light Green ('Weber'; 'York') 2 = Medium Green ('Corsoy 79'; 'Braxton')
3 = Dark Green ('Gnome'; 'Tracy')

13. FLOWER COLOR:

[2] 1 = White 2 = Purple 3 = White with purple throat

14. POD COLOR:

[1] 1 = Tan 2 = Brown 3 = Black

15. PLANT PUBESCENCE COLOR:

[1] 1 = Gray 2 = Brown (Tawny)

16. PLANT TYPES:

[2] 1 = Slender ('Essex'; 'Amsoy 71') 2 = Intermediate ('Amcor'; 'Braxton')
3 = Bushy ('Gnome'; 'Govan')

17. PLANT HABIT:

[1] 1 = Determinate ('Gnome'; 'Braxton') 2 = Semi-Determinate ('Will')
3 = Indeterminate ('Nebsoy'; 'Improved Pelican')

18. MATURITY GROUP:

[0][6] 1 = 000 2 = 00 3 = 0 4 = I 5 = II 6 = III 7 = IV 8 = V
9 = VI 10 = VII 11 = VIII 12 = IX 13 = X

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

BACTERIAL DISEASES:

[0] Bacterial Pustule *(Xanthomonas phaseoli* var. *sojensis)*

[0] Bacterial Blight *(Pseudomonas glycinea)*

[0] Wildfire *(Pseudomonas tabaci)*

FUNGAL DISEASES:

[0] Brown Spot *(Septoria glycines)*

Frogeye Leaf Spot *(Cercospora sojina)*

[0] Race 1 [0] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [0] Other *(Specify)*

[0] Target Spot *(Corynespora cassiicola)*

[0] Downy Mildew *(Peronospora trifoliorum* var. *manshurica)*

[0] Powdery Mildew *(Microsphaera diffusa)*

[0] Brown Stem Rot *(Cephalosporium gregatum)*

[0] Stem Canker *(Diaporthe phaseolorum* var. *caulivora)*

7

19. DISEASE REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant) (Continued)

FUNGAL DISEASES: (Continued)

[0] Pod and Stem Blight *(Diaporthe phaseolorum* var; *sojae)*

[1] Purple Seed Stain *(Cercospora kikuchii)*

[0] Rhizoctonia Root Rot *(Rhizoctonia solani)*

Phytophthora Rot *(Phytophthora megasperma* var. *sojae)*

[0] Race 1 [0] Race 2 [0] Race 3 [0] Race 4 [0] Race 5 [0] Race 6 [0] Race 7

[0] Race 8 [0] Race 9 [0] Other *(Specify)* _____

VIRAL DISEASES:

[0] Bud Blight (Tobacco Ringspot Virus)

[0] Yellow Mosaic (Bean Yellow Mosaic Virus)

[0] Cowpea Mosaic (Cowpea Chlorotic Virus)

[0] Pod Mottle (Bean Pod Mottle Virus)

[2] Seed Mottle (Soybean Mosaic Virus)

NEMATODE DISEASES:

Soybean Cyst Nematode *(Heterodera glycines)*

[0] Race 1 [0] Race 2 [1] Race 3 [0] Race 4 [0] Other *(Specify)* _____

[0] Lance Nematode *(Hoplolaimus Colombus)*

[0] Southern Root Knot Nematode *(Meloidogyne incognita)*

[0] Northern Root Knot Nematode *(Meloidogyne Hapla)*

[0] Peanut Root Knot Nematode *(Meloidogyne arenaria)*

[0] Reniform Nematode *(Rotylenchulus reniformis)*

[0] OTHER DISEASE NOT ON FORM *(Specify)*: _____

20. PHYSIOLOGICAL RESPONSES: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[0] Iron Chlorosis on Calcareous Soil

[0] Other *(Specify)* _____

21. INSECT REACTION: (Enter 0 = Not Tested; 1 = Susceptible; 2 = Resistant)

[0] Mexican Bean Beetle *(Epilachna varivestis)*

[0] Potato Leaf Hopper *(Empoasca fabae)*

[0] Other *(Specify)* _____

22. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED.

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant Shape	Natto-Shohryuh	Seed Coat Luster	Natto-Shohryuh
Leaf Shape	Natto-Shohryuh	Seed Size	Natto-Shohryuh
Leaf Color	Natto-Shohryuh	Seed Shape	Natto-Shohryuh
Leaf Size	Natto-Shohryuh	Seedling Pigmentation	Natto-Shohryuh
	Natto-Shohryuh		8

23. GIVE DATA FOR SUBMITTED AND SIMILAR STANDARD VARIETY: Paired Comparison Data

VARIETY	NO. OF DAYS MATURITY	PLANT LODGING SCORE	CM PLANT HEIGHT	LEAFLET SIZE		SEED CONTENT		SEED SIZE G/100 SEEDS	NO. SEEDS/ POD
				CM Width	CM Length	% Protein	% Oil		
Submitted	134	3	83	-	-	43.9	16.0	8.1	-
Name of Similar Variety	Raiko	Raiko	Natto-Shohryuh	-	-	Natto-Shohryuh	Natto-Shohryuh	Natto-Shohryuh	-

PUBLICATIONS USEFUL AS REFERENCE AIDS FOR COMPLETING THIS FORM:

1. Caldwell, B.E., ed. 1973. Soybeans: Improvement, Production, and Uses. Amer. Soc. Agron. Monograph No. 16.
2. Buttery, B.R. and R.I. Buzzell. 1968. Peroxidase activity in seeds of soybean varieties. Crop Sci., 8: 722-725.
3. Hymowitz, T. 1973. Electrophoretic analysis of SBTI-A_2 in the USDA soybean germplasm collection. Crop Sci., 13: 420-421.
4. Payne, R.C. and L.F. Morris. 1976. Differentiation of soybean cultivars by seedling pigmentation patterns. J. Seed Technol. 1: 1-19.

SOYBEAN

"Kosuzu"

14D. Exhibit D: Additional Description of "Kosuzu".

A new and distinct soybean variety, as illustrated and described in Exhibit C, is further characterized as follows:

The color of hypocotyl and flower is purple, and the leaflet shape is oval.

The pubesence is grey and vertical, and their number is moderate.

The plant height and main stem length are slightly shorter, and the number of main stem nodes and the branching number is less than the original variety "Natto-Shohryuh", but when in a standard classification, these characteristics are long, abundant and moderate, respectively.

The plant is a determinate growth habit, the pod color at maturity is tan.

The seeds are extremely small, with a 100-seed weight of 8 to 10g. This is the same or slightly smaller than the original variety.

The flowering time is moderate, as for "Suzuyutaka" but is earlier than "Natto-Shohryuh", and the maturing time is moderate, as for "Nanbushirome", but is earlier than "Natto-Shohryuh".

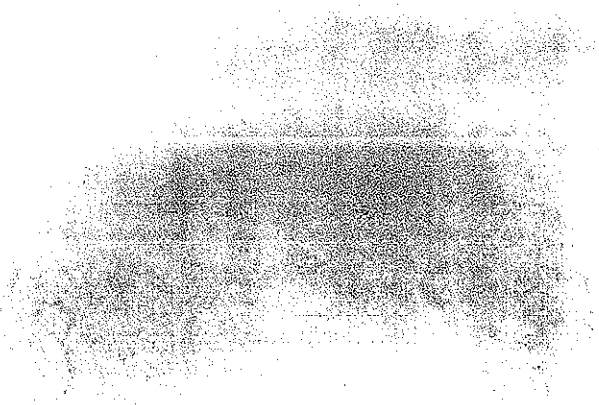
The degree of dehiscente is a moderate resistance as for "Raiden".

The resistance to lodging is moderate, although said resistance of the original variety is poor.

The content of the seed component does not differ from that of the original variety, and has a moderate crude protein and a poor crude lipid.

The plant is resistant to the A and B strains of soybean mosaic virus, but is susceptible to the soybean cyst nematode, Heterodera glycines, and scab, Elsinoe glycines.

This plant has a fairly high productivity for such an extremely small-seeded variety and is well suited for natto processing.



SOYBEAN

"Kosuzu"

14E. Exhibit E: State of Basis of Applicant's Ownership

The variety, Kosuzu, was originated and developed by Iwao Watanabe, Tsugio Nagasawa, Shoichi Murakami, Dr. Koji Hashimoto, Kijiro Kokubun and Shinji Sakai, employees of the Tohoku National Agricultural Experiment Station, Ministry of Agriculture, Forestry and Fisheries, in Japan. By agreement between the employees and employer all rights to any invention, discovery, or development made by employees employed at the Tohoku National Agricultural Experiment Station were assigned to the Experiment Station, with no rights of any kind being retained by the employees.